

## WHAT IS CLAIMED IS:

1. A process for reversible sorption of sulfur trioxide onto a sorbent comprising a) contacting from about 15% to 100% sulfur trioxide with the sorbent  
5 under anhydrous conditions at a temperature of from about 35°C to about 150°C thereby sorbing the sulfur trioxide onto the sorbent, b) desorbing sulfur trioxide from the sorbent at a temperature of from about 150°C to about 350°C at about atmospheric pressure, or under a vacuum pressure, and c) recycling said sorbent by continuously repeating steps a) and b), wherein said sorbent has a pore size of  
10 at least 0.5 nm, and consists essentially of silica or zeolite, said zeolite having a silicon to aluminum ratio in the ranges of from about 1 to about 4.4 or greater than about 5.1.
2. The process of Claim 1 wherein a provider sorbs the sulfur trioxide onto the sorbent and provides it to a user, and the user desorbs the sulfur trioxide  
15 and recycles the sorbent to the provider.
3. The process of Claim 1 wherein the sulfur trioxide sorbed and desorbed is of purity of from about 99% to 100%.
4. The process of Claim 3 wherein the sulfur trioxide is of a purity of at least 99.9%.
- 20 5. The process of Claim 1 wherein the sorbent has sorbed thereon from about 3% to about 60% by weight sulfur trioxide.
6. The process of Claim 1 wherein the sulfur trioxide is sorbed onto the sorbent at a temperature of from about 50°C to about 125°C.
7. The process of Claim 1 wherein the sorbent is a silicalite or a  
25 zeolite having a silicon to aluminum ratio of at least 25.
8. A sorbent consisting essentially of silica or zeolite, said zeolite having a silicon to aluminum ratio in the ranges of from about 1 to about 4.4 or greater than about 5.1, said sorbent having a pore size of at least 0.5 nm, and having adsorbed thereon a minimum of about 1% by weight sulfur trioxide.
- 30 9. The sorbent of Claim 8 having a silicon to aluminum ratio of at least 25.
10. The sorbent of Claim 8 in a pelletized, beaded or chopped form.